Medical Surveillance

(Medical Event Reports and Weekly DNBI Reporting)

&

Outbreak Investigation

Preparing for Deployment Surveillance

Objectives

I. Define Medical Surveillance
II. Understand two Medical Surveillance Systems in use: Sick call surveillance [Disease & Non-battle Injuries (DNBI)] and Medical Event Reports
III. Describe basic steps in outbreak investigation
IV. Describe the chain of infection
V. Describe how to break the chain using Outbreak investigation and Medical Surveillance data

Definitions

- **Endemic Illness – The constant presence of a disease or infectious agent in a geographic area or among a group of people**
- **Epidemic Illness – Frequency or rate of illness clearly in excess of what is normally expected in a region or community (also called an outbreak)**

Medical Surveillance

- **Regular collection, summarization and analysis of data on newly diagnosed cases of disease or injury either in a defined population or geographic location**
  - **Data collection must be systematically collected and summarized**
  - **Leads to recognition of seasonal or long-term trends, areas of high or low-risk, occupational risk, age and sex risk**

Desirable Attributes of Surveillance

- Simplicity
- Flexibility
- Acceptability
- Sensitivity/Specificity
- Representative
- Timeliness
- Usefulness

Why Medical Surveillance?

- Ensure timely and adequate response
- Estimation of:
  - Distribution
  - Trends
  - Risks
- Development and assessment of policy and resource allocation
- Identification of emerging or re-emerging diseases and other threats

Current Surveillance Systems

- Disease Non-Battle Injury Reporting
  - JCS Mandated
  - Deployed forces
- Medical Event Reporting System
  - BUMED Instruction
  - Basically the same as CDC's infectious disease surveillance system

JCS-DNBI Reporting Background Information

- JCS memo requires weekly DNBI surveillance during war operations
- OIF, OEF surveillance ongoing
- NAVCENT formally implemented DNBI Surveillance in February, 2000
  - COMFIFTHFLEET R010100Feb00 (message)
- Expect other fleet commands to follow

DoD References

- Joint Chiefs of Staff Memorandum, "Deployment Health Surveillance and Readiness" CJCS MCM-251-98 , 4 Dec 1998
- DoDI 6490.3, "Implementation and Application of Joint Medical Surveillance for Deployments," 7 Aug 1997
- DoDD 6490.2, Joint Medical Surveillance,
  30 Aug 1997

JCS Concept of Deployment Health Surveillance

- Identifying the population at risk
- Recognizing and assessing hazardous exposures
- Employing specific countermeasures
- Monitoring health outcomes – when required by the CINC or in units that meet the JCS definition of deployed

Purpose of Weekly Disease Surveillance

- **A unit's *"Vital Signs"***
  - **Enables local personnel to accurately summarize the current health of their population and use this quantitative information to focus command attention to locally interrupt adverse trends**
  - **Enables unit medical personnel and chain to quickly and accurately monitor the unit's health on a weekly basis**
- **When rolled up with other units' data, fleet trends can be noted and interventions implemented to try to decrease DNBI impact on the fleet**

Other Potential Purposes

- **May enable earlier warning and detection for overt/covert chemical or biological attack**
- **Early warning for toxic exposures in theater**
  - **Water, air, other pollution**

***The Bottom Line*: Facilitates ongoing awareness of unit health at unit level**

Attributes of JCS DNBI Surveillance

- Need for timeliness and unit public health action separates this from pure epidemiologic surveillance
- Emphasis on timely response
  - Weekly DNBI Reporting is essentially a problem-finding process that emphasizes subsequent action at the local level
  - Unit level collects and also ***RESPONDS***

Why do we track new medical complaints in these categories?

- Cases are easily placed in these categories (unlike the difficulty associated with using ICD codes)
- "We can fix that!"
  - Many of these categories have readily definable public health intervention strategies that can be quickly and effectively implemented by the unit to decrease DNBI if category rates increase

Prerequisites for Disease Surveillance

- Organized health care system
- "Buy in" from the people who collect the data to ensure a dedicated attempt at accurate reporting
- Classification system
  - Misclassification of new patient cases is the *Achilles heel* - for weekly surveillance
  - Units must work hard to ensure accurate category classification

DNBI Reporting Problems

- Confusion about what does and does not belong in each surveillance category
- Confusion about how to report LD, SIQ, Admits
- Two F/U categories are confusing
- Denominators not accurately reported (these should NOT be estimates)
  - Total onboard/troop strength (not joined strength)
  - Female strength onboard
- Follow-up visits being mixed with new patient complaints

JCS-Approved Categories (Two Types)

- **Medical Incidence Categories**
  - **15 DNBI disease categories (+ total)**
- **Administrative Categories**
  - **Dental - meant to track acute dental problems NOT workload**
  - **Admin/Follow-up - meant to track other non-incident visits (workload estimate)**

Current JCS-Approved Medical Incidence Categories

Combat/Operational Stress Rxn
Dermatologic
GI, Infectious
Gynecologic
Heat/Cold Injury
Injury, Sports
Injury, MVA
Injury, Work/Training
Injury, Other
Ophthalmologic
Psychiatric
Respiratory
STD
Fever, Unexplained
All other Med/Surg
Total DNBI

- ***incident diseases only***
- ***one pt can have more than one complaint***
- ***required to track LD, SIQ days, and Admits in each category***

Category Notes

- **Patient visits . . . count ONLY the initial (incident) visit**
  - **Follow-up visits are totaled in the administrative category at the bottom of the form (Misc / Admin / Follow-up) category**
- **All initial sick call visits should be placed in a DNBI category**
  - **A single patient can technically be placed in more than one category (i.e. presenting with a new ankle sprain and new URI), but should at least be placed in the most important category**
  - **If in doubt about which category, make your best guess**
- **Estimate the total number of days of LD, SIQ (lost work day), or Admission required in each category that week and record these in the appropriate category columns**

Special Situations

- **Also note the following with comments on the Weekly DNBI Report:**
  - **Deaths**
  - **Serious Injury**
  - **Serious illness requiring transfer to higher echelons of care**

Combat/Operational Stress Reaction

- **Definition – Includes acute debilitating mental, behavioral, or somatic symptoms thought to be caused by operational or combat stressors, that are not adequately explained by physical disease, injury or a preexisting mental disorder, and that can be managed with reassurance, rest, physical replenishment, and activities that restore confidence.**

Dermatological

- **Definition – Diseases of the skin and subcutaneous tissue, including heat rash, fungal infection, cellulitis, impetigo, contact dermatitis, blisters, ingrown toenails, unspecified dermatitis, etc. Includes sunburn.**

Gastrointestinal, Infectious

- **Definition – All diagnoses consistent with infection of the intestinal tract. Includes any type of diarrhea, gastroenteritis, “stomach flu,” nausea/vomiting, hepatitis, etc.**
- **Note – Does not include non-infectious intestinal dx such as hemorrhoids, ulcers, etc. (they go in the Med/Surg category)**

Gynecological

- Definition – menstrual abnormalities, vaginitis, pelvic inflammatory disease, or other conditions related to the female reproductive system
- Note – not reported for units with no females onboard that week. The denominator for calculating this rate is based on the number of females onboard that week – NOT the total number of unit personnel onboard that week

Heat/Cold Injuries

- **Definition – Climatic injuries, including heat stroke, heat exhaustion, heat cramps, dehydration, hypothermia, frostbite, trench foot, immersion foot, and chilblains**
- **Note – most events in this category also require a medical event report to the cognizant NEPMU**

Injuries, Recreational/Sports

- Definition – Any injury occurring as a direct consequence of the pursuit of personal and/or group fitness, excluding formal training
- Note – Includes personal physical training, but not unit PT injuries

Injuries, Motor Vehicle Accidents

- **Definition – Any injury occurring as a direct consequence of any motorized vehicle trauma either as a passenger or pedestrian**

Injury, Work/Training

- **Definition – Any injury occurring as a direct consequence of military operations/duties or of an activity carried out as part of formal military training, to include organized runs and physical fitness programs**
- **Note – Does NOT include military motor vehicle-related injuries (belong in MVA category)**

Injury, Other

- **Definition – Any new injury not included in the previously defined injury categories**

Ophthalmologic

- **Definition – Any acute diagnosis involving the eye, including “pink eye,” conjunctivitis, sty, corneal abrasion, foreign body, new onset vision problems, etc.**
- **Note – Does NOT include routine referral for glasses, eye exams, etc.**

Psychiatric, Mental Disorder

- **Definition – Debilitating mental, behavioral or somatic symptoms that meet diagnostic criteria for or have been previously diagnosed as a psychiatric/mental disorder.**
- **Note – Does not include symptoms due to identified physical disease or injury, or symptoms better explained as a transient combat/operational stress reaction.**
  - **Usually these are events that lead to MEDEVAC for further evaluation**

Respiratory

- **Definition – Any diagnosis of the lower respiratory tract such as bronchitis, pneumonia, emphysema, reactive airway disease, and pleurisy; or of the upper respiratory tract such as the common cold, URI, laryngitis, tonsillitis, tracheitis, otitis, and sinusitis**
- **Note – May also include respiratory-transmitted infections such as varicella or mumps that require a separate medical event report**

Sexually Transmitted Diseases

- **Definition – All sexually transmitted infections including chlamydia, new onset HIV, gonorrhea, syphilis, herpes, chancroid, and new venereal warts**
- **Note – Most of these diagnoses require a separate medical event report**

Fever, Unexplained

- **Definition – Temperature of 100.5^{0}F or greater for 24 hours, or history of chills and fever without a clear diagnosis that cannot be explained by other concurrent inflammatory / infectious processes such as respiratory infection or heat illness**
- **Note – The intent of this category is to serve as sentinel category for many tropical diseases**

All Other, Medical/Surgical

- **Definition – Any medical or surgical condition not fitting into any of the other incident disease categories.**
- **Note – Includes new hernia, hemorrhoid, vasectomy, non-specific abdominal pain that is not thought to be infectious GI, etc.**

Total DNBI

Definition – The sum of the number of new patient complaints in each of the surveillance categories

Administrative Categories

- Dental (for acute complaints NOT workload)
- Misc./Admin/Follow-up
  - Meant to track other non-incident visits
- Definable (optional)
  - Can locally break out other categories, annual TB data, etc. that the command finds useful as long as the primary data is rolled up into one of the approved categories
  - Added at the BOTTOM of the form

Other Data Collected

- **Person-days of Light Duty (LD)**
  - **Total days of LD assigned in that category this week**
- **Person-days of Lost Duty (SIQ)**
  - **Total days of SIQ assigned in that category this week**
- **Admits**
  - **Total number of persons admitted to ward/hospital that week (includes evacs for admission)**
- **Bed-days**
  - **Total number of days of hospitalization for unit personnel in that category that week (includes evacs for admission)**

What is the significance of DNBI category suggested reference rates?

- Starting point for determining whether you have a problem
- Based on historical data from ground forces in garrison
- Local thresholds can be established by units
  - CENTCOM, NAVCENT, NEPMU can assist (i.e. mathematical models +/- 2 standard deviations, etc.)

What are these other rates?
(other column info)

- DNBI rates are calculated as percentages
  - Percentage Rate per week
  - For example – 5 cases of URI per 100 crew members
- LD, SIQ, Admits, Bed-days
  - Utilization Rate per week/per 100 crew members
- Can be calculated automatically by the spreadsheet
  - Note that spreadsheet formulas easily become corrupted so check them before you preach them

Administrative Notes

- **Additional categories, conditions, or outcomes of local interest can be added and tracked**
  - **Keep these separate from the official, JCS DNBI Weekly DNBI Report (i.e. at the bottom of the form – not in it)**
  - **For data collected electronically, it is important to maintain the same format from week to week (For example, if spreadsheet cell C,3 is the cell for initial visits for Dermatologic Problems, it should be C,3 every week)**
- **Save and archive each Weekly DNBI report as a separate file**
  - **Example: Tarawa 4-10Mar01.xls**
  - **Helps unit to do trend comparisons against their own past history when needed**

Summary

- **Weekly DNBI Surveillance monitors the "*vital signs*" of the unit**
- **Only new patient complaints are tracked in the category surveillance**
- **An accurate on-board strength is crucial information – do NOT use total joined strength**
- **Many partners must work together to ensure the health of the Deployed Fleet**

CENTCOM DNBI Rates

Cumulative for NAVCENT (rates per 1000) 15 March 2003 – 28 May 2005

	NAVCENT	MARCENT	OIF	OEF	CENTCOM
Combat Stress	**0.1**	**0.7**	**0.4**	**0.0**	**0.4**
Derm	**6.1**	**5.1**	**5.7**	**3.0**	**5.6**
GI	**2.6**	**3.2**	**2.8**	**6.0**	**2.9**
Gyn	**1.0**	**0.3**	**0.7**	**0.1**	**0.7**
Heat/Cold	**0.2**	**0.2**	**0.2**	**0.6**	**0.2**
Injury Sports	**1.7**	**1.3**	**1.5**	**0.6**	**1.5**
Injury MVA	**0.1**	**0.2**	**0.1**	**0.1**	**0.1**
Injury Work Training	**4.0**	**3.3**	**3.7**	**4.0**	**3.7**
Injury Other	**2.5**	**2.8**	**2.6**	**1.7**	**2.6**
Ophtho	**1.2**	**0.9**	**1.0**	**0.8**	**1.0**
Psych	**0.9**	**0.3**	**0.6**	**0.2**	**0.6**
Resp	**6.8**	**4.8**	**5.8**	**3.7**	**5.8**
STD	**0.4**	**0.1**	**0.3**	**0.1**	**0.3**
Fever	**0.1**	**0.1**	**0.1**	**0.0**	**0.1**
All Other Med Surg	**12.6**	**7.8**	**10.3**	**2.3**	**10.3**
Total Injury	**8.3**	**7.6**	**8.0**	**6.5**	**7.9**
Total DNBI	**40.2**	**31.1**	**35.9**	**23.2**	**35.8**

*Note OIF, OEF, and CENTCOM totals do not include ARCENT or CENTAF data.

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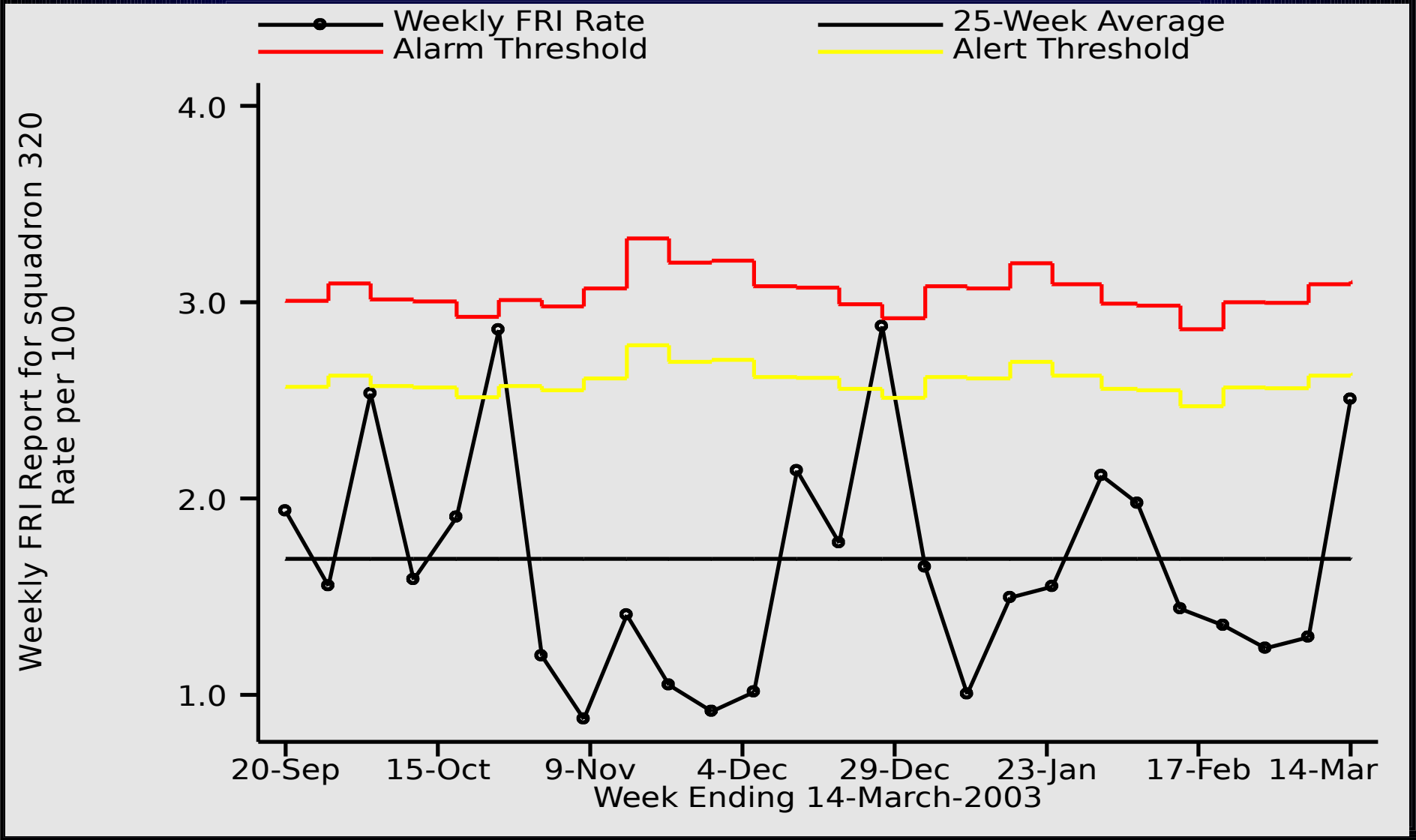
Analysis & Interpretation

Process Control Chart



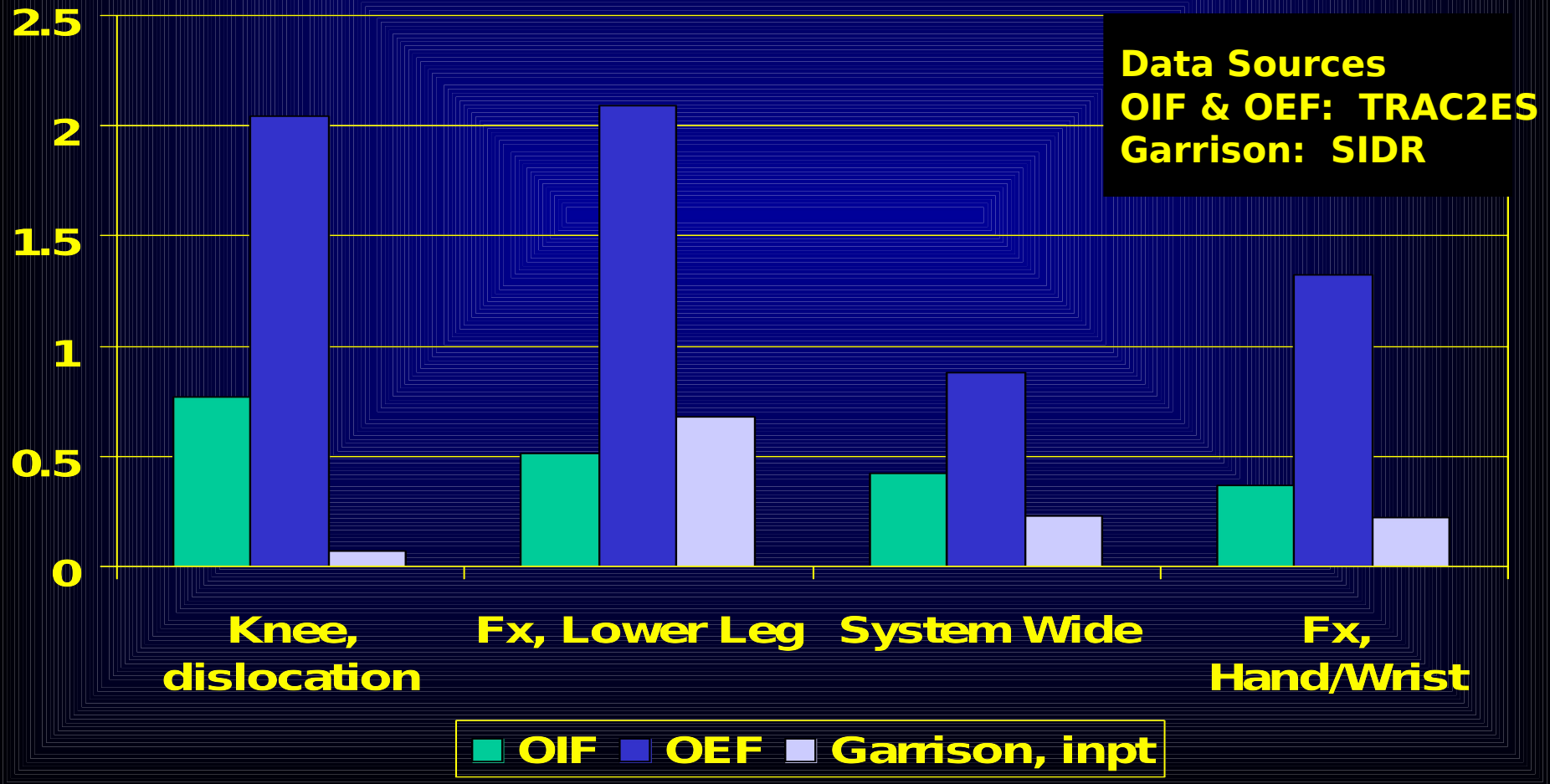
Rank Order Burden Matrix Results "Top 7" for Various Environments

	OIF (TRAC2ES)	OEF (TRAC2ES)	Garrison Inpatient	Garrison Outpatient
1	Dislocation, Knee	Dislocation, Knee	Fracture, Lower Leg/Ankle	Sprains, Lower Leg/Ankle
2	Fracture, Lower Leg/Ankle	Fracture, Low Leg/Ankle	Fracture, Face	Sprains, Lower Limb, unspec.
3	Fracture, unspec	Fracture, Hand/Wrist	*TBI, Type 1	Sprains, unspec.
4	System Wide/ Late Effects	Sprains, Shoulder/Arm	System Wide/ Late Effects	Sprains, Shoulder/ Arm
5	Fracture, Hand/Wrist	System Wide/ Late Effects	*TBI, Type 2	Fracture, Hand/Wrist
6	Dislocation, Shoulder/Arm	Fracture, unspecified	Fracture, Hand/Wrist	Open Wound, Hand/Wrist
7	Fracture,	Fracture,	Fracture, Forearm/Elbo	Sprains,

*TBI=Traumatic Brain Injury, Type 1 most severe

Comparison of Selected Injury Complexes

Annualized Rates per 1000 Service Memb



Medical Event Reports

- BUMED Instruction 6222.12A, 21 OCT 1998
- Applies to all Naval ships, stations and units providing outpatient or inpatient medical care
- Reporting of selected diseases, injuries and outbreaks

Medical Event Reports

- Required reporting of approximately 80 diagnoses categorized by ICD-9 codes
- Usually done using NDRS
  - MS-Access based program
  - Preventive Medicine staff needs to generate report
- Now a part of SAMS
  - If SAMS used for logging sick-call visits, it will automatically generate an e-mail report
- Chain of report: MTF to NEPMU to NEHC
- Rates released by NEHC in Naval Medical Surveillance Report

Comparison: Weekly DNBI Reporting and Medical Event Reporting

Comparison of the 2 Systems:

	Weekly DNBI	Medical Event Reporting
System:	JCS/CINC Program Sample form in memo	Navy Disease Reporting System (NDRS)
Tracks:	Counts of diseases in 1 of 15 categories	Cases of specific diseases identified by ICD-9 code (approx. 70 specific diseases)
Units Submit:	Weekly via chain of command	As they occur to cognizant NEPMU

Basic steps in Outbreak Investigation

- Verify the diagnosis
- Gather data to determine whether there is an outbreak
- Formulate hypothesis
- Systematically test hypothesis
- Take definitive action
  - Submit MEDICAL EVENT REPORT via NDRS

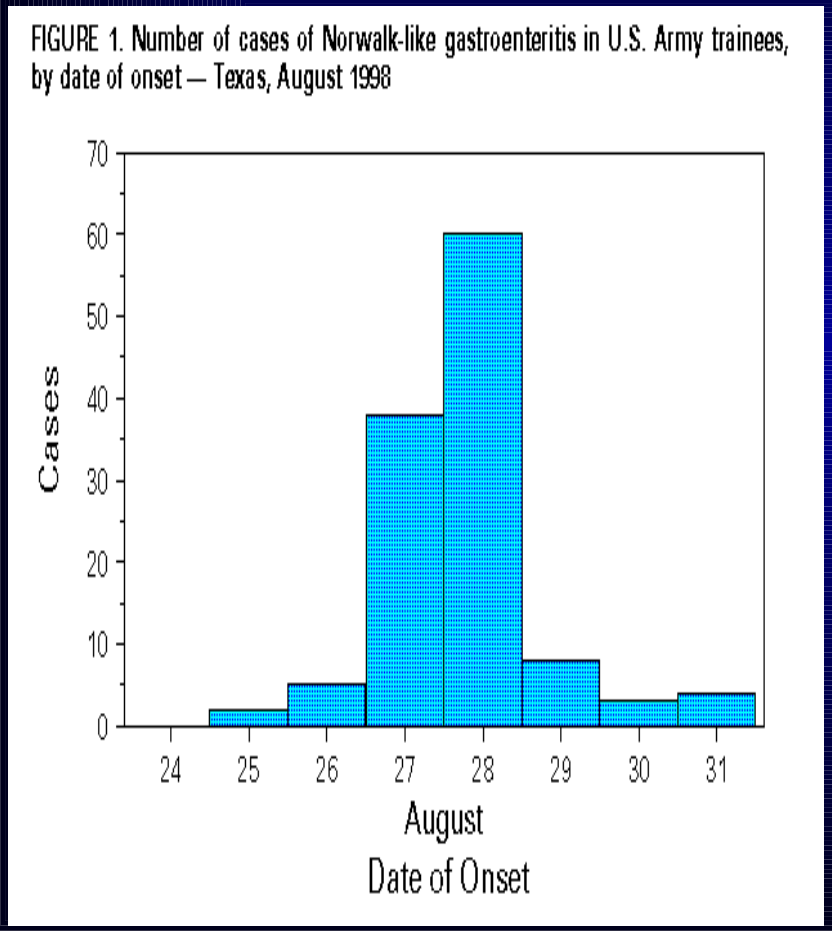
Outbreak – Verify the Diagnosis

- Examine clinical presentation and histories
- Usually requires some laboratory confirmation
- Verified diagnosis should help you define a typical clinical case (signs and symptoms)
  - You will need a clear case definition later for the outbreak investigation

Verify Outbreak
Is There a Problem?

- **Must determine the baseline/endemic rate of disease – Use:**
  - **Routine surveillance data (DNBI data)**
  - **Review of medical records (Clinic, ER, Hospital Admissions, Hospital Lab data, etc.)**
  - **Local Public Health Dept statistics**
- **Decide - expected rate and current rate**
  - **Count cases (numerator)**
  - **Determine appropriate population (denominator)**
  - **Is the current rate of illness higher than the expected (baseline) rate?**

Compare Current and Expected (Baseline) Rates



- 835 soldiers in 2 units
- 28 AUG, Current Diarrhea Rate = 62/835 x 100 = 7.4%
- Expected Rate - ER records show = 0.2%
- Conclude: Outbreak!
- Now find out cause and act to remedy

Develop Case Definition

- Defined set of signs, symptoms and time period for their appearance
  - Example: All active-duty who have had at least 3 liquid or unformed bowel movements in one day during the last week
  - Example: All people who have had vomiting or nausea during the last week
- Initially, make it broad and then narrow it

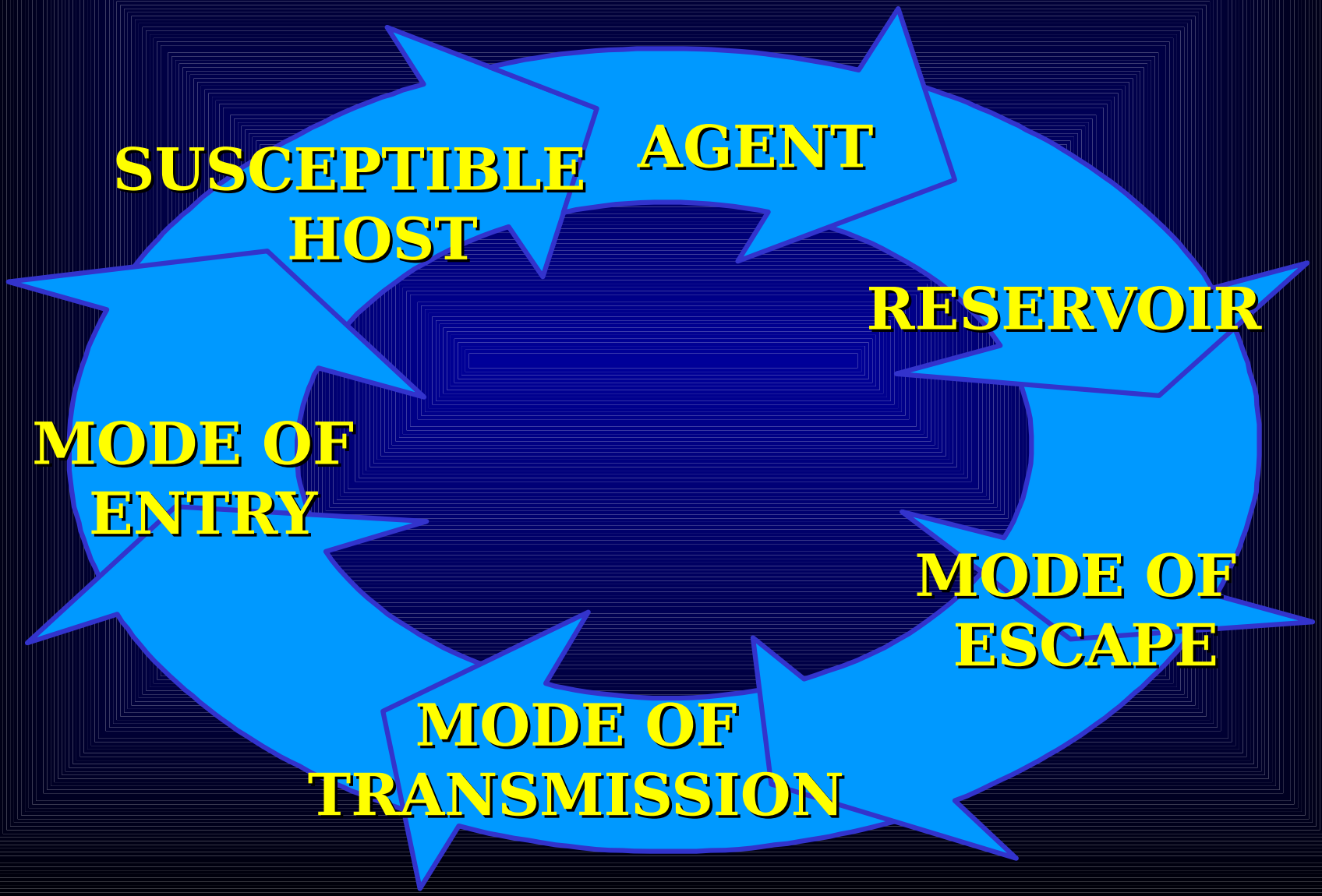
Collect Appropriate Data

- **Once case is defined, collect information about persons who may have the disease**
  - **Age, gender, race, occupation?**
- **Information about place**
  - **Where they ate, get drinking water, berthing, work space, etc.?**
- **Information about time**
  - **When did symptoms start, finish?**

Stop the Spread of Disease

- Recommend general hygiene measures to break the epidemic chain, even before the cause is identified
- Prevention
  - Immunize, ensure all personnel up-to-date
  - Cover mouth/nose when coughing/sneezing
  - Wash hands
  - Enteric Precautions
  - Clean restrooms frequently especially if someone has been sick
  - Properly cook food
  - Avoid cross contamination

The Chain of Infection



How To Break The Chain

- Example: Foodborne Outbreak
- Agent - Destroy or remove the pathogens
  - Proper food storage
    - Inhibit bacterial growth and toxin formation
  - Proper food preparation
    - Kills bacteria and viruses and may destroy some toxins
  - Food Source
    - Use only certified, uncontaminated food/water sources
  - Sanitation
    - Water and food treatment: Halogenation, Pasteurization
    - Keep facilities clean and sanitized
    - Wash food and food preparation surfaces

How To Break The Chain

- Reservoir-Where an infectious agent lives
  - Immunization
  - Prophylaxis (antibiotics, antiparasitics, immunoglobulin)

How To Break The Chain

- **Mode of Escape**
  - **Ill personnel should not prepare or serve food**
  - **Rupture of skin lesion – People with skin lesions should not handle food**
  - **Feces**
    - **Use of Latrines**
    - **Proper waste disposal**
  - **Isolate cases and quarantine contacts**

How To Break The Chain

- **Mode of Transmission**
  - **Hand washing**
  - **Latrines**
    - **Fly-proof, sufficient toilet paper**
  - **Animal Control**
    - **Control flies, roaches, rats by using traps and pesticides and sealing all waste containers**
    - **Mosquito abatement**

How To Break The Chain

- Mode of Entry
  - Respiratory precautions
  - Bloodborne disease precautions
  - Be careful where and what you eat and drink
  - Use DEET and other personal protective measures
  - Condoms

How To Break The Chain

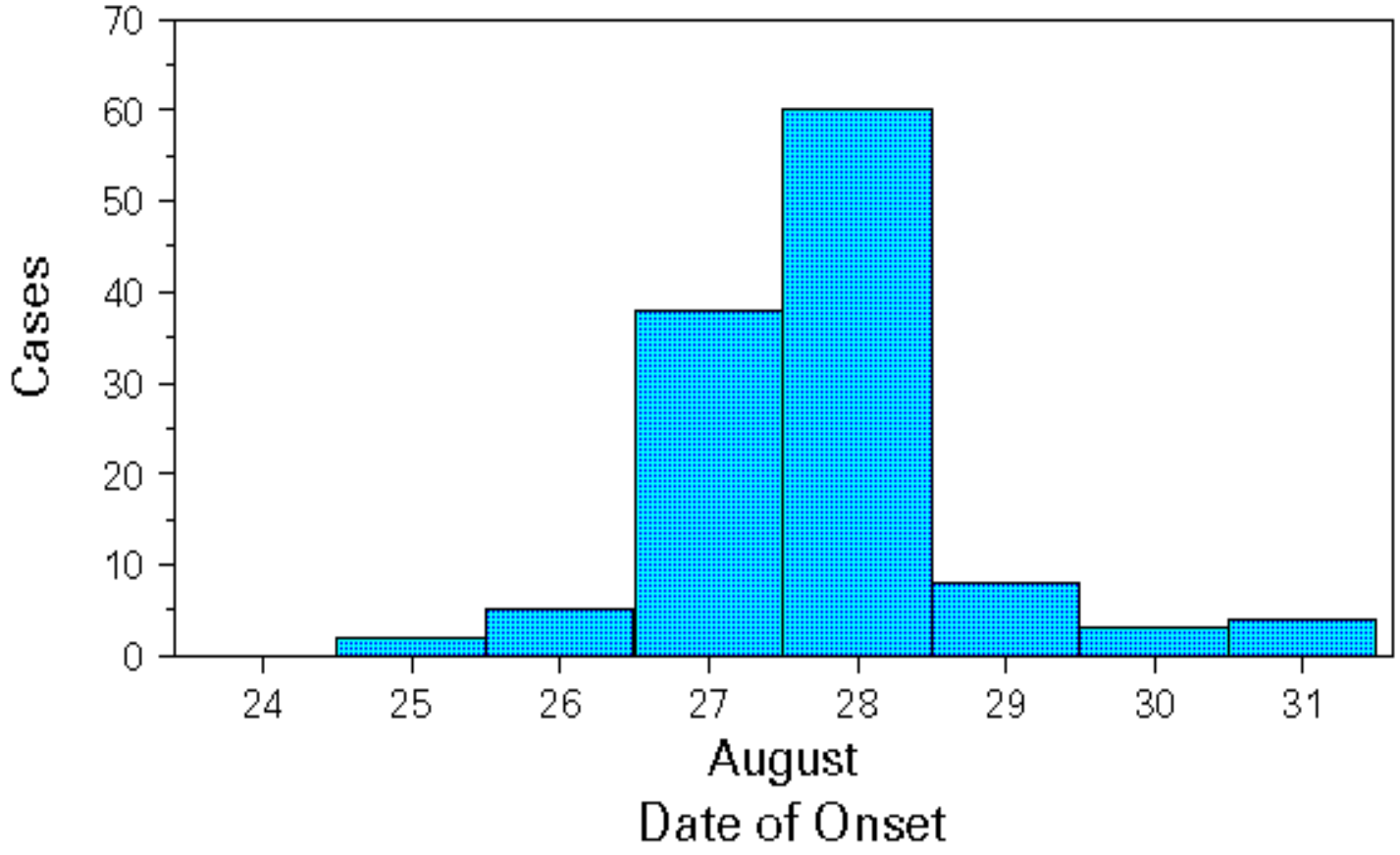
- Susceptible host
  - Immunizations
  - Optimize Nutrition (healthy hosts are less susceptible)

Describe the Epidemic

- Plot epidemic curve, time of onset on x-axis, number ill on y-axis
  - Helps confirm epidemic vs. endemic disease
  - Charts course and magnitude of epidemic
  - Helps determine mode of transmission
    - Single peak = point source
    - Diffuse pattern = person to person

Describe the Epidemic

FIGURE 1. Number of cases of Norwalk-like gastroenteritis in U.S. Army trainees, by date of onset — Texas, August 1998



Formulate and Test Hypothesis

- Hypothesis: What caused people to get sick?
  - Base on characteristics of epidemic, suspected agent, and opinions of patients and medical personnel
- Gather and analyze data
  - Calculate attack rates in susceptible population

Identify Agent and Source

- **Calculate** specific attack rates
  - **Obtain food history questionnaires from all exposed persons**

    = # ill exposed (ate “food X”)

    total # exposed (ate “food X”)

    = # ill not exposed (didn’t eat “food X”)

    total # not exposed (didn’t eat “food X”)
- **Calculate** attack rate ratio

Attack Rates and Ratios

- How to calculate attack rates and ratios:
- Attack Rate equals: $\frac{\text{\# ill exposed}}{\text{Total \# people exposed}}$
  - e.g. 50 people ate potato salad (Total #) and 9 became ill (# ill).
  - Attack Rate of those who ate potato salad = 9/50 = 18%
- Attack Ratio: $\frac{\text{Attack Rate of exposed}}{\text{Attack Rate of not exposed}}$

Attack Rates and Ratios

Attack Ratio: Attack Rate of exposed / Attack Rate of not exposed

FOOD	*Attack Rate* ATE	*Attack Rate* DID NOT EAT	RATIO
Tossed Salad	13.8%	15.4%	13.8%/15.4% = 0.9
Chowder	12.2%	20.0%	12.2%/20.0% = 0.6
Potato Salad	17.8%	1.0%	17.8%/1.0% = 17.8
Ice Cream	15.7%	9.3%	15.7%/9.3% = 1.7

Recommend Preventive Measures

- Remove suspect food items early
- Provide training on food handling, hygiene
- Inspect latrines, ensure there are hand washing stations and toilet paper
- Vector control
- Correct mechanical problems
- Ensure proper ventilation

Submit Medical Event Report

- BUMEDINST 6220.12A, 21 OCT 98
- All outbreaks are reportable
- MER (Medical Event Report)
  - Food/water associated illness
    - Within 24 hours
  - Any unusual clustering of disease/symptoms
- NDRS software program
  - www-nehc.med.navy.mil

Outbreak Investigation Review

- Establish that an outbreak is occurring
- Develop case definition and collect data
  - Signs and/or symptoms (suspect/probable case)
  - Laboratory confirmation (confirmed case)
  - Person, place, time
- Obtain laboratory specimens
  - From cases: blood, emesis, stool
  - From food, etc: food, containers, utensils
- Analyze Data
- Take Action

Where to Get More Information

- **NEPMU-2 Norfolk**
  - epi-nepmu2-nor@nepmu2.med.navy.mil
- **NEPMU-7 Sigonella**
  - sig1emk@sig10.med.navy.mil
- **NEHC**
  1) http://www-nehc.med.navy.mil/prevmed/epi/depsurv.htm
  2) http://www-nehc.med.navy.mil/prevmed/ epi/nmsrpage.htm
  3) http://www-nehc.med.navy.mil/prevmed/epi/stop.htm - (notificable disease reporting)

An army that does not suffer from countless diseases is said to be certain of victory.

--Sun Tzu